

Integrated Vibration and Acceleration Testing to Reduce Payload Mass, Cost and Mission Risk, Phase I

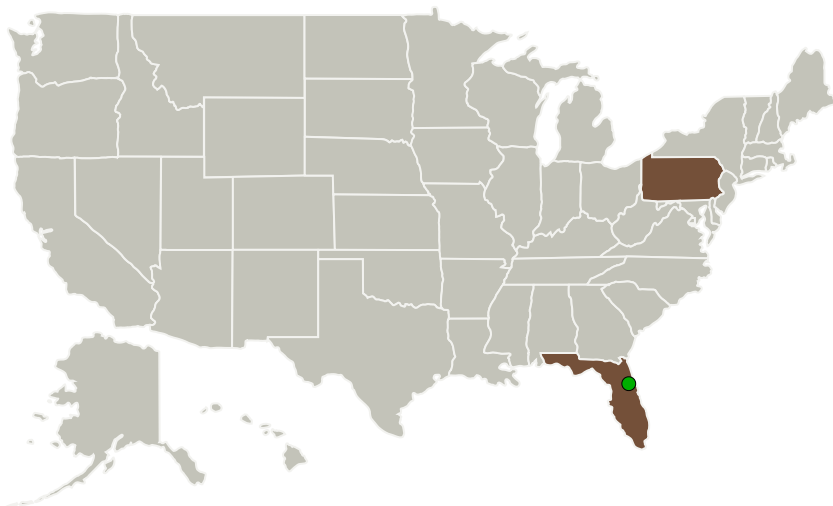
Completed Technology Project (2012 - 2013)



Project Introduction

We propose to develop a capability to provide integrated acceleration, vibration, and shock testing using a state-of-the-art centrifuge, allowing for the test of synergistic effects of these combined environments. By installing a shaker table on the centrifuge, the test setup can provide both sustained and dynamic-g loads as well as simultaneous vibration loads, in two independent axes. This method will provide more realistic launch environments for testing launch payloads. By providing a more realistic test environment, combined environment testing has the potential to reduce cost, save time, reducing risk and increase performance. Launch vibration data for a Terrior-Orion two-stage suborbital sounding rocket was used as a basis for analysis. The data presents a typical launch load environment in that two main loads exist: 1) sustained-g load from acceleration of the rocket, and 2) random vibration and shock loads. The current fixed-table vibration test devices are incapable of simulating both of these loads at the same time. Accordingly, the current test methodologies typically overstress the payload to ensure that the system survives the launch loads. By enabling the proposed capability to test payloads by simultaneously applying sustained-g and vibration loads, we can more closely simulate the actual launch conditions, resulting in risk, schedule and cost reduction.

Primary U.S. Work Locations and Key Partners



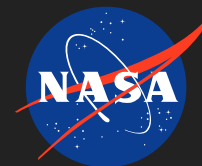
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Organizations Performing Work	Role	Type	Location
American Aerospace Advisors, Inc	Lead Organization	Industry	Radnor, Pennsylvania
Drexel University	Supporting Organization	Academia	Philadelphia, Pennsylvania
 Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations

Florida	Pennsylvania
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Project Transitions

 **February 2012:** Project Start

 **February 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138228>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

American Aerospace Advisors, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

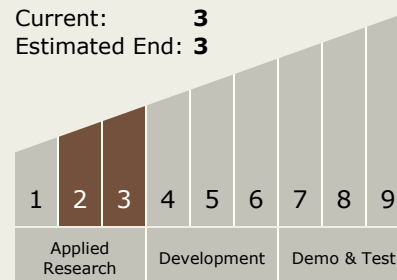
David Yoel

Technology Maturity (TRL)

Start: **2**

Current: **3**

Estimated End: **3**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - └ TX13.2 Test and Qualification
 - └ TX13.2.8 Environment Testing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System